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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/596,133	Applicant(s) KAUS ET AL.
	Examiner BERNARD KRASNIC	Art Unit 2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If no period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 01 June 2006.
 2a) This action is FINAL. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-8 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1-8 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 01 June 2006 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) Information Disclosure Statement(s) (PTO/SB/08)
 Paper No(s)/Mail Date _____
- 4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date _____
 5) Notice of Informal Patent Application
 6) Other: _____

DETAILED ACTION

Information Disclosure Statement

1. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: Ref. No. 3 in Fig. 1.
3. The drawings are objected to because the top end of Ref. No. 3 is not connected to anything. The drawings are also objected to because Ref. No. 2 has no description in the empty box; the empty box labeled Ref. No. 2 should include the word -- memory --.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure

number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

5. The abstract of the disclosure is objected to because it is required to be on a separate sheet. Further, the phrase "The present invention aims at improving" in lines 1-2 is suggested to be -- A system and method aims at improving --. Further, the phrase "According to the present invention, a force field" in lines 4-5 is suggested to be -

- According to the system and method, a force field --.

Correction is required. See MPEP § 608.01(b).

6. The disclosure is objected to because of the following informalities:

Page 1, line 4: The -- CROSS REFERENCE TO RELATED APPLICATIONS -- section must be included in the specification above the "BACKGROUND OF THE INVENTION" section to inform of any related applications, in this case the 371 of PCT/IB04/52711 12/08/2004 and Foreign application EPO 03104571.9 12/08/2003.

Appropriate correction is required.

7. The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading.

- (a) TITLE OF THE INVENTION
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS
- (c) BACKGROUND OF THE INVENTION
 - (1) Field of the Invention
 - (2) Description of Related Art
- (d) BRIEF SUMMARY OF THE INVENTION
- (e) BRIEF DESCRIPTION OF THE DRAWING(S)
- (f) DETAILED DESCRIPTION OF THE INVENTION

Appropriate correction is required.

Claim Objections

8. Claims 1, 7 and 8 are objected to because of the following informalities:

Claim 1: The dashes "-" for each of the limitations of claim 1 are suggest to be deleted.

Claim 1 at line 3: The claim limitation "as being of elastic material such that" is suggested to be -- as being elastic such that -- because an image doesn't really correspond with material but does with pixels.

Claim 1 at line 7: "on the basis" should be -- on a basis --. Similar discussions are addressed with regards to claim 7 at line 9, and claim 8 at line 8.

Claim 7 at line 4: It is noted that the clause "adapted to" has been used. The "adapted to" clause, which suggests or makes optional but does not require steps to be performed or does not limit a claim to a particular structure, does not limit the scope of a claim or claim limitation. See MPEP 2106. It is suggested that the "adapted to" clause be taken out of the claim(s) to thereby recite a positive limitation.

Appropriate correction is required.

Art Unit: 2624

9. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.

When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare *In re Lowry*, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and *Warmerdam*, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with *Warmerdam*, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).

In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See *Lowry*, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

10. Claim(s) 8 is/are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claim 8 defines a software program embodying functional descriptive material (i.e., a computer program or computer executable code). However, the claim does not define a "computer-readable medium or computer-readable memory" and is thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be

Art Unit: 2624

realized" – Guidelines Annex IV). The scope of the presently claimed invention encompasses products that are not necessarily computer readable, and thus NOT able to impart any functionality of the recited program. The examiner suggests amending the claim(s) to embody the program on "computer-readable medium" or equivalent [more specifically, the Examiner suggests the claim limitation "Software program for registering a first image and a second image, wherein the software program causes a processor to perform the following operation when the software program is executed on the processor:" to be – A computer-readable storage medium storing a computer program for registering a first image and a second image, wherein the program causes a processor to perform the method comprising: –]; assuming the specification does NOT define the computer readable medium as a "signal", "carrier wave", or "transmission medium" which are deemed non-statutory (refer to "note" below). Any amendment to the claim should be commensurate with its corresponding disclosure.

Note:

"A transitory, propagating signal ... is not a "process, machine, manufacture, or composition of matter." Those four categories define the explicit scope and reach of subject matter patentable under 35 U.S.C. § 101; thus, such a signal cannot be patentable subject matter." (In re Nutrien, 84 USPQ2d 1495 (Fed. Cir. 2007)). Should the full scope of the claim as properly read in light of the disclosure encompass non-statutory subject matter such as a "signal", the claim as a whole would be non-statutory. Should the applicant's specification define or exemplify the computer readable medium or memory (or whatever language applicant chooses to recite a computer readable

Art Unit: 2624

medium equivalent) as statutory tangible products such as a hard drive, ROM, RAM, etc, as well as a non-statutory entity such as a "signal", "carrier wave", or "transmission medium", the examiner suggests amending the claim to include the disclosed tangible computer readable storage media, while at the same time excluding the intangible transitory media such as signals, carrier waves, etc.

Merely reciting functional descriptive material as residing on a tangible medium is not sufficient. If the scope of the claimed medium covers media other than "computer readable" media (e.g., "a tangible media", a "machine-readable media", etc.), the claim remains non-statutory. The full scope of the claimed media (regardless of what words applicant chooses) should not fall outside that of a computer readable medium.

11. Claim(s) 1-6 [claims 2-6 are dependent upon claim 1 respectively] is/are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. The Federal Circuit¹, relying upon Supreme Court precedent², has indicated that a statutory "process" under 35 U.S.C. 101 must (1) be tied to a particular machine or apparatus, or (2) transform a particular article to a different state or thing. This is referred to as the "machine or transformation test", whereby the recitation of a particular machine or transformation of an article must impose meaningful limits on the claim's scope to impart patent-eligibility (See *Benson*, 409 U.S. at 71-72), and the involvement of the machine or transformation in the claimed process must not merely be insignificant

¹ *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

extra-solution activity (See *Flook*, 437 U.S. at 590"). While the instant claim(s) recite a series of steps or acts to be performed, the claim(s) neither transform an article nor positively tie to a particular machine that accomplishes the claimed method steps, and therefore do not qualify as a statutory process. That is, for example the significant method steps of registering, determining a similarity, and determining a force field are not tied to another statutory category such as a particular apparatus (i.e. a computer processor for processing the specific method steps). Any amendment to the claim(s) should be commensurate with its corresponding disclosure.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

12. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

13. Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re Claim 3 at line 2: The claim limitation "determining at least one second parameter" renders this claim indefinite because it is unclear what the first parameter is. The Examiner suggests "The method of claim 1" to be -- The method of claim 2 --.

² *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v.*

Appropriate correction is required.

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

15. Claims 1-4 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Kohlrausch ("A new class of elastic body splines for nonrigid registration of medical images" – Bildverarbeitung fur die Medizin 2001 Algorithmen Systeme Anwendungen, pages 164-168).

Re Claim 1: Kohlrausch discloses a method of registering / elastic registration a first image / source image and a second image / target image (see Kohlrausch, Section 2 in pages 165-166) [*although the Examiner has given weight to the limitation of registering, this limitation of registering is not necessarily needed to be given weight because this limitation of registering is not positively recited in the claim body, the Examiner suggests positively reciting this limitation of registering in the body of the claim*], the method comprising the steps of: assuming the first image / source and target images as being of elastic material such that it has an elasticity (see Kohlrausch, Section 2 in pages 165-166, the two brain tissue images have an elastic deformation between them); determining a similarity / match between the first image / source image and the second

image / target image (see Kohlrausch, Section 2 in pages 165-166, a match between the two images is performed by determining equation 2 in order to perform elastic registration); and determining a force field / Gaussian force which, when applied to the first image, increases the similarity / match (see Kohlrausch, Section 2 in pages 165-166, the coefficients c_i correspond to the strength of the Gaussian forces and these coefficients are used in determining equation 2 for matching the two images in order to perform elastic registration, Gaussian forces are used over the polynomial forces to produce better matching results); wherein the force field / Gaussian force is determined on the basis of an analytic equation / analytically (see Kohlrausch, Section 2 in pages 165-166, the Gaussian force is determined by the analytic equation 1, Section 3 in page 166 at paragraph 2 ["In the first experiment ..."] at lines 7-10).

Re Claim 2: Kohlrausch further discloses the step of determining at least one first parameter / σ the standard deviation of the Gaussian of the force field / Gaussian force such that the similarity / match is maximized (see Kohlrausch, Section 2 in pages 165-166, Gaussian forces are used over the polynomial forces to produce better matching results in order to perform elastic registration).

Re Claim 3 [as best understood by the Examiner]: Kohlrausch further discloses the step of determining at least one second parameter / c_i relating to the elasticity of the first image / the source and target images [the parameter c_i is used in determining equation 2 for matching in order to perform elastic registration] such that the similarity / match is

maximized (see Kohlrausch, Section 2 in pages 165-166, the coefficients c_i correspond to the strength of the Gaussian forces and these coefficients are used in determining equation 2 for matching the two images in order to perform elastic registration, Gaussian forces are used over the polynomial forces to produce better matching results).

Re Claim 4: Kohlrausch further discloses wherein the at least one first parameter includes at least one of a force strength / c_i of at least one force of the force field / Gaussian force (see Kohlrausch, Section 2 in pages 165-166, the coefficients c_i correspond to the strength of the Gaussian forces), a force direction of at least one force of the forces of the force field, at least one location where at least one force of the force field acts on the first image, a form of at least one force of the force field, a standard deviation of a Gaussian force / σ the standard deviation of the Gaussian of the Gaussian force applied as the at least one force of the forces of the force field / Gaussian force (see Kohlrausch, Section 2 in pages 165-166) and a Poisson ratio.

Re Claim 6: Kohlrausch further discloses wherein the method is applied to data sets relating to one of RTP, MRI / MR brain images (see Kohlrausch, see Section 3 at paragraph 3 ["In the second experiment ..."] at lines 1-2), SPECT, PET and US.

Art Unit: 2624

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kohlrausch in view Wyman et al (US 7,106,891 B2). The teachings of Kohlrausch have been discussed above.

Re Claim 7: The discussions are addressed with respect to claim 1.

However, Kohlrausch doesn't explicitly suggest the well known components [a memory and an image processor] of a computer system which practices its image processing techniques.

Wyman discloses an image processing device [e.g. Fig. 6], comprising: a memory / image storage [Ref. No. 620 of Fig. 6] for storing a first image / 105 of Fig. 1 and a second image / 110 of Fig. 1 (see Wyman, Fig.'s 1 and 6, col. 7 at lines 31-42, col. 11 at lines 18-40); and an image processor / CPU [Ref. No.'s 610, 630 and 635 of Fig. 6] for registering / image registration the first image and the second image (see Wyman, Fig.'s 1 and 6, col. 7 at lines 31-42, col. 11 at lines 18-40).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kohlrausch's image processing technique, using Wyman's teaching by including a memory and processor in order to have a general-purpose computer system practice image registration processing (see Wyman, Fig.'s 1 and 6, col. 7 at lines 31-42, col. 11 at lines 18-40).

As to claim 8, the claim is the corresponding software program claim to claim 7 respectively. The discussions are addressed with regard to claim 7.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Shao et al discloses a physiological model based non-rigid image registration; Roche et al discloses an electronic device for automatic registration of images; Hay discloses an automatic registration of intra-modality medical volume images; Moshfeghi discloses a registration of volumetric images which are relatively elastically deformed by matching surfaces; Xu et al discloses an automated temporal subtraction of medical images; Zhu et al discloses imaging registration using likelihood maximization; Hay discloses an automatic registration of intra-modality medical volume images; Pekar discloses deformable image registration by adaptive Gaussian forces.

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BERNARD KRASNIC whose telephone number is (571)270-1357. The examiner can normally be reached on Mon. - Thur. and every other Friday from 8am - 4pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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